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CORONA PET

SUBJ: MISSION 1035 PHOTOGRAPHIC EVALUATION INTERIM REPORT (PEIR)

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1. NUMERICAL SUMMARY

MSN NO AND DATES: 1035-1 21-25 SEPTEMBER 1966
 1035-2 25-30 SEPTEMBER 1966

LAUNCH DATE AND TIME: 20 SEPTEMBER 1966/2114Z

VEHICLE NUMBER: 1628

CAMERA SYSTEM: J-36 (PG-1)

PAN CAMERA NOS: FORWARD-LOOKING (MASTER) 188
 AFT-LOOKING (SLAVE) 189

MSN 1035-1 S/I NO: D95/112/113

MSN 1035-2 S/I NO: D96/104/116

RECOVERY REVS: MSN 1035-1 D-81
 MSN 1035-2 D-160

17 OCT 1966

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2. CAMERA SETTINGS

FORWARD-LOOKING 0.225 INCH SLIT
 WRATTEN 23A FILTER

AFT-LOOKING 0.175 INCH SLIT,
 WRATTEN 21 FILTER

3. PERFORMANCE SUMMARY

Declassification Review by NGA/DoD

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A. THE IMAGE QUALITY OF MISSION 1035-1 AND 1035-2 IS CONSISTENTLY GOOD AND EQUAL TO THE BEST OF ANY RECENT MISSION. A PRIMARY REASON FOR THE HIGH QUALITY OF THESE MISSIONS IS CONSIDERED TO BE UNUSUALLY GOOD ATMOSPHERIC CONDITIONS. ANALYSIS OF CLOUD COVER FROM INDEX CAMERA PHOTOGRAPHY SHOWS AN EXCEPTIONALLY HIGH PERCENTAGE OF CLOUD FREE AREAS (SEE PARA. 6, COMMENTS). FOR THE FIRST TIME IN OVER A YEAR, A YAW PROGRAMMER WAS USED. THE IMPROVED IMAGE MOTION COMPENSATIONS IS PROBABLY A FACTOR CONTRIBUTING TO THE QUALITY OF THIS MISSION.

B. VISUAL COMPARISON OF ON AND DP FILMS FROM BOTH MISSIONS INDICATE THAT THE AFT CAMERA IMAGERY CONTAINS GREATER DETAIL THAN THAT OF THE FORWARD CAMERA. THIS RELATIONSHIP BETWEEN FORWARD AND AFT CAMERA PHOTOGRAPHY QUALITY HAS BEEN OBSERVED IN MOST PREVIOUS "J" MISSIONS AND IS ATTRIBUTED TO THE USUAL DIFFERENCE IN ILLUMINATION GEOMETRY WHICH RESULTS IN A GREATER AMOUNT OF HAZE LIGHT STRIKING THE MASTER CAMERA. IT IS ALSO NOTED THAT THE SLAVE CAMERA USED A NARROWER SLIT WHICH PRODUCED SHORTER EXPOSURES.

C. NO CORN TARGETS WERE RECORDED ON THIS MISSION.

D. MISSION 1035 IS THE FIRST "J" SYSTEM FLOWN WITH THE PHOTOGRAMMETRIC CONFIGURATION. THE RAIL HOLE IMAGES AND LENS SCAN LINES PRODUCED BY BOTH CAMERAS SHOWED SOME DEFECTS BUT IN GENERAL WERE EQUIVALENT TO PRE-FLIGHT TEST RESULTS AND APPEAR TO PROVIDE ADEQUATE PHOTOGRAMMETRIC DATA POINTS. DETAILS OF PG DATA ARE DISCUSSED IN PARAGRAPH 5.

4. ANOMALIES

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ANOMALIES INCLUDING THOSE REPORTED IN THE "31" MESSAGES (REFS. A AND B.) WERE REVIEWED. THE TEAM CONSIDERS THIS MISSION TO HAVE FEWER SIGNIFICANT ANOMALIES THAN ANY OTHER "J" SYSTEM TO DATE.

A. ANOMALOUS STREAKED TIMING PULSES ON THE SLAVE CAMERA FILM OF MISSION 1035-1 WERE REPORTED IN REFERENCE A. ALSO REPORTED WERE 26 UNPROGRAMMED STELLAR/INDEX EXPOSURES AFTER A MASTER CAMERA OFF COMMAND.

CAUSE: BOTH CONDITIONS ARE THE NORMAL RESULT OF A NEW STELLAR/INDEX CONTROL ARRANGEMENT WHICH SWITCHES CONTROL FROM MASTER TO SLAVE CAMERA WHEN ONLY THE LATTER IS OPERATING. THIS NEW CONTROL ARRANGEMENT WILL BE INSTALLED ON ALL FUTURE "J-1" SYSTEMS.

ACTION: NONE, NORMAL OPERATION.

B. STARBOARD HORIZON IMAGES FROM BOTH MAIN CAMERAS WERE REPORTED TO BE OVEREXPOSED BY REFERENCE A AND B.

CAUSE: WHILE THE DENSITIES PRODUCED BY THE STARBOARD HORIZON CAMERAS APPEARED TO BE GREATER THAN THOSE OF THE PORT CAMERAS, IT IS THE OPINION OF THE TEAM THAT THE STARBOARD IMAGE DENSITIES WERE IN A NORMAL AND ACCEPTABLE RANGE. THE CAUSE OF THE VARIATION IS NOT KNOWN.

ACTION: REPORTS NO MENSURATION DIFFICULTIES WITH THE "TI" COPY FURNISHED THEM FOR THIS PURPOSE (A NORMAL PROCEDURE). IN VIEW OF THIS, THE ONLY ACTION RECOMMENDED AT THIS TIME IS FOR TO TAKE SPECIAL NOTICE OF THIS ON SUBSEQUENT MISSIONS TO DETERMINE IF A CHANGE IN EXPOSURE IS INDICATED.

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C. SEVERAL MINOR SPOTS OF LIGHT LEAK FOG WERE DETECTED ON BOTH PAN CAMERA FILMS IN ASSOCIATION WITH LONG INACTIVE PERIODS.

CAUSE: SOURCES OF THESE LIGHT LEAKS ARE NOT KNOWN. IT IS NOTED THAT THIS SYSTEM IS THE FIRST FLOWN WITH IMPROVED MAIN CAMERA SEALS AND THAT THE MAGNITUDE OF THE LEAKS IS LESS THAN GENERALLY EXPERIENCED IN THE PAST.

ACTION: INVESTIGATE POSSIBLE SOURCES OF THESE LIGHT LEAKS.

[REDACTED]

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D. ONE SMALL PARTICLE OF FOREIGN MATTER IS RECORDED AT DIFFERENT POINTS WITHIN THE STELLAR FORMATS OF 1035-1 AND 1035-2.

CAUSE: IT APPEARS THAT A SMALL FOREIGN PARTICLE HAS ADHERED TO THE REAR OF THE RESEAU PLATE IN EACH STELLAR CAMERA, AND THUS APPEARS SOMEWHAT OUT-OF-FOCUS AND REMAINS IN THE SAME POSITION FOR THE ENTIRE 1035-1 AND 1035-2 MISSIONS.

ACTION: INVESTIGATE POSSIBLE CAUSES.

[REDACTED]

[REDACTED]

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E. ONE TYPE OF MINUS DENSITY STREAK WAS OBSERVED ONCE ON THE FORWARD IN 1035-2, AND RANDOMLY ON THE AFT-LOOKING MATERIAL IN BOTH 1035-1 AND 1035-2. THESE STREAKS WERE ALONG THE SCAN DIRECTIONS AND EVIDENCED A BIAS IN THE DIRECTION OF IMC FOR EACH INSTRUMENT.

CAUSE: THE CAUSE APPEARS TO BE A LOOSE PARTICLE THAT WAS RANDOMLY IN CONTACT WITH THE NUMBER SIX LENS ELEMENT (FIELD FLATTENER). IT IS NOTED THAT THIS IS AN INHERENT POSSIBILITY OF THE SYSTEM.

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ACTION: POLISHED RAILS (EFFECTIVE WITH "J-37) AND UP) SHOULD TEND TO REDUCE THE AMOUNT OF EMULSION PARTICLES REMOVED FROM THE FILM AND THUS REDUCE THE PROBABILITY OF OBSTRUCTIONS TO THE IMAGE PATH. THE TEAM BELIEVES THAT A SPECIFIC ACTION IS NOT WARRANTED.

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F. A MINUS DENSITY STREAK IN MASTER CAMERA ON MATERIAL APPEARS RANDOMLY DURING BOTH 1035-1 AND 1035-2. THIS ANOMALY IS DIFFERENT FROM THAT REPORTED IN PARA. 4E, ABOVE, IN THAT IT DOES NOT EXTEND THE FULL LENGTH OF THE FORMAT BUT DOES EXTEND ACROSS UNEXPOSED AREAS BETWEEN FORMATS AS WELL AS THROUGH HORIZON FORMATS. THE MAGNITUDE OF THESE STREAKS IS VERY MINOR.

CAUSE: SINCE THE AFFECTED ON MATERIAL WAS NOT AVAILABLE TO THE PET, ANALYSIS WAS LIMITED TO DP MATERIAL. WHILE THE ANOMALY COULD RESULT FROM A MANUFACTURING DEFECT, IT APPEARS MUCH MORE PROBABLE THAT IT IS PRESSURE MARKING WHICH COULD HAVE OCCURRED AT ANY TIME BETWEEN MANUFACTURE AND PROCESSING.

ACTION: ANALYZE THE ORIGINAL NEGATIVE WHEN AVAILABLE TO DETERMINE IF CAUSE OF DEFECTS CAN BE ESTABLISHED. (MONITOR:

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G. DESCRIPTION: SMALL CRESCENT SHAPED FOG PATTERNS WERE OBSERVED IN INTERMITTENT GROUPS ADJACENT TO THE RAIL HOLE IMAGES ON THE DATA BLOCK EDGE OF THE MASTER FILM. THE DISTANCE BETWEEN THE PATTERNS IS APPROXIMATELY ONE CM AND PARALLEL TO THE RAIL HOLES. IMAGES WERE RANDOM AND DID NOT OCCUR AFTER THE MIDDLE OF THE "A" MISSION. THESE IMAGES ALSO APPEARED RANDOMLY THROUGH THE H.O. MARGINS. IMAGES WERE PRESENT WITH AND WITHOUT THE NODAL

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TRACES AND DID NOT INTERFERE WITH THE RAIL HOLE IMAGES.

CAUSE: UNKNOWN. THESE IMAGES WERE NOT OBSERVED IN THE GROUND TEST MATERIAL. THE CONDITION IS PROBABLY DUE TO PRES-SURE MARKING.

ACTION: NONE INDICATED. REVIEW TEST MATERIAL TO VERIFY LACK OF TEST HISTORY.

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H. IN MISSION 1035-2, THE LAST TWO FEET OF THE FORWARD MATERIAL AND THE LAST EIGHT FEET OF THE AFT MATERIAL WAS CON-TAMINATED BY A SUBSTANCE WHICH ALSO LEFT A RESIDUE IN THE THE RECOVERY CAPSULE.

CAUSE: A SMALL AMOUNT OF ELECTROLITE (POTASSIUM HYDROXIDE) WAS SPILLED FROM THE RECOVERY BATTERY AT THE TIME OF AIR RE-COVERY. A NEW VENT DEVICE HAS BEEN DESIGNED BY A/P TO PREVENT RECURRENCE OF THIS CONDITION.

ACTION: MONITOR EFFECTIVITY OF CHANGE.

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I. CHARACTERISTIC ANOMALIES: THERE ARE CERTAIN CHARACTERISTIC ANOMALIES THAT ARE CONSIDERED INHERENT TO THE OPERATION OF THE CORONA SYSTEM. WHILE THESE ITEMS WARRANT ATTENTION TO PREVENT FURTHER DEGRADATION, IT IS NOT FELT THAT SPECIFIC ACTION ITEMS SHOULD BE ASSIGNED. A SUMMARY OF THESE ITEMS AND THE DEGREE OF DEGRADATION IS PRESENTED BELOW.

(1) RAIL SCRATCHES FROM BOTH PAN CAMERAS VARIED FROM SLIGHT TO SEVERE. ACCUMULATIONS OF SCRAPED MATERIAL CAUSED RAGGED FORMAT EDGES TO AN AVERAGE EXTENT.

(2) DENDRITIC STATIC DISCHARGE ALONG THE EDGES OF BOTH PAN

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CAMERA FILMS IS CONSIDERED NORMAL. NO DENDRITIC STATIC DISCHARGE WAS NOTED ON EITHER OF THE STELLAR/INDEX RECORDS. HOWEVER, THERE WAS MINOR REPETITIVE MARKING IN THE MARGIN OF THE 1035-2 INDEX RECORD WHICH MAY HAVE BEEN PRESSURE INDUCED.

(3) SCRATCHES WITHIN THE FORMATS OF BOTH PAN CAMERAS CAUSED BY THE SCAN HEAD ROLLERS ARE LESS THAN NORMAL.

(4) INTERMITTENT FINE SCRATCHES GENERALLY PARALLEL TO THE MAJOR AXIS OF BOTH MAIN FILMS OCCURRED TO AN AVERAGE EXTENT. THESE LINES ARE OFTEN NOT DETECTABLE IN PRINTS.

(5) PLUS DENSITY STATIC MARKING ALONG BOTH STELLAR FILM MARGINS WAS NORMAL.

(6) THE PLUS DENSITY STREAKS, REFERRED TO AS "JETTISONED FUEL PARTICLES" IN THE FIRST PART OF 1035-1 STELLAR WERE MORE FREQUENT THAN USUAL.

5. PHOTOGRAMMETRIC DATA RECORDING (PG)

NOTE THAT THIS IS A PRELIMINARY ANALYSIS BASED ON LIMITED DATA. MORE COMPLETE REPORTS WILL BE FORTHCOMING FROM THE USING COMMUNITY.

A. THE ANALYSIS OF THE DATA PRESENTATION PECULIAR TO THE PG PORTION OF 1035-1 AND 1035-2 WERE MADE FROM ON MATERIAL AND WERE COMPARED DIRECTLY WITH INSTRUMENT SAMPLINGS PRODUCED DURING A/P TESTING AT R-4 DAY. IN GENERAL, THE MASTER INSTRUMENT (FWD-LOOKING NO. 188) PRODUCED CONSISTENTLY BETTER QUALITY RAIL HOLE IMAGES FROM BOTH RAILS THAN DID THE SLAVE INSTRUMENT. THE INBOARD RAIL HOLE IMAGES ON BOTH INSTRUMENTS ARE OF GENERALLY BETTER QUALITY THAN THE OUTBOARD RAIL HOLE IMAGES.

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B. THE MASTER INSTRUMENT INBOARD RAIL HOLE IMAGE DIAMETERS RANGED FROM 60 TO 70 MICRONS WITH THE IMAGE SIZE GENERALLY SMALLER IN THE FLIGHT MATERIAL THAN THE CORRESPONDING IMAGES IN THE A/P TEST MATERIAL. FLIGHT IMAGES EXHIBITED GOOD CIRCULARITY, EDGE SHARPNESS AND DENSITY. THE FLIGHT DENSITIES WERE SOMEWHAT LESS THAN A/P TEST DENSITIES. THIS CAN BE ATTRIBUTED IN PART TO THE DIFFERENCES IN SCAN RATES FOR THESE MATERIAL SAMPLES. THE OUTBOARD RAIL HOLE IMAGES ARE SOMEWHAT LARGER THAN THE INBOARD, BEING 75 TO 90 MICRONS IN DIAMETER. THE GENERAL OUTBOARD IMAGE SHAPE IS LESS CIRCULAR, BEING SOMEWHAT ELONGATED IN THE SCAN DIRECTION BUT COMPARING QUITE WELL WITH THE A/P TEST SAMPLES.

C. THE SLAVE INSTRUMENT (AFT-LOOKING NO. 189) PRODUCED GENERALLY NON-CIRCULAR OVAL IMAGES WITH APPROXIMATE IMAGE SIZE OF 75 TO 85 MICRONS. THESE IMAGES EXHIBIT LOWER DENSITIES, POORER OVERALL IMAGE QUALITY, AND DEGRADED EDGE SHARPNESS AS COMPARED TO THE A/P TEST SAMPLES.

D. THE LOSS OF THE RAIL HOLE IMAGES AS REPORTED IN REF A AND B WAS CORRELATED IN PART BY THE PASSAGE OF A MANUFACTURING SPLICE WHICH APPARENTLY DISLODGED MICRO PARTICLES OF EMULSION FROM THE RAIL SURFACE FILLING THE HOLES, AND CAUSING THE LOSS OF IMAGERY. ON MATERIAL COVERING THE AREA OF THE MANUFACTURING SPLICE WAS NOT AVAILABLE FOR REVIEW BY THE PET.

E. THE SIZE AND READABILITY OF THE RAIL HOLE IMAGES ON THE DUPLICATE POSITIVES IS MORE VARIABLE THAN THAT OF THE ORIGINAL NEGATIVE. THE PRINCIPLE CAUSE FOR THIS VARIABILITY IN IMAGE HOLE QUALITY IS DUE TO THE WIDE RANGE OF PRINTING CONDITIONS WHICH MAY

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OCCUR AS A RESULT OF OPTIMIZING THE TERRAIN IMAGERY AND NOT THE HOLE IMAGERY. IN ADDITION ANY FOREIGN MATERIAL INTRODUCED IN THE REPRODUCTION PROCESS WHICH MAY RESULT IN A MINUS DENSITY PIN HOLE IMAGE MAY CREATE A READABILITY PROBLEM. IS WORKING ON THE PROBLEM OF MINIMIZING THE MINUS DENSITY PIN HOLE IMAGES.

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F. THE NODAL TRACES ON THE ORIGINAL NEGATIVES ARE QUITE SIMILAR IN APPEARANCE TO THOSE SEEN IN PRE-FLIGHT TESTING. THE ONLY NOTICEABLE CHANGE IS THE EXPECTED DECREASE IN LINE WIDTH FROM 40-50 MICRONS DURING AMBIENT TESTING TO APPROXIMATELY 25 MICRONS IN FLIGHT. THERE WERE SOME INSTANCES IN THE FORWARD CAMERA WHERE THE NODAL TRACES FAILED TO APPEAR AS WELL AS INSTANCES WHERE THE TRACES STARTED AFTER THE BEGINNING OF SCAN. ALSO ON BOTH CAMERAS THERE WERE APPARENTLY RANDOM INSTANCES OF UNDULATING NODAL TRACES. SIMILAR CONDITIONS WERE NOTED IN TEST AND ARE ATTRIBUTED IN PART TO THE OPERATION OF THE LENS TO STOVE INTERLOCK AND IN PART TO AN IMBALANCE OF THE MAIN LENS AND COLLIMATOR ASSEMBLIES. TESTING AT A/P ON THE "J-38" (PG-2) SYSTEM INDICATES THAT THESE CONDITIONS WILL BE SUBSTANTIALLY IMPROVED ON FUTURE PG SYSTEMS. IT SHOULD BE NOTED THAT THE VALIDITY OF THE TRACE AS A RECORD OF THE POSITION OF THE OPTICAL AXIS IS NOT AFFECTED BY THE UNDULATION.

G. THE NODAL TRACES DO NOT APPEAR TO OBSCURE TERRAIN DETAIL AS MUCH AS HAD BEEN ANTICIPATED. WHILE THE TRACES ARE QUITE DISTINCT EXCEPT IN EXTREMELY DENSE IMAGE AREAS, IT IS STILL POSSIBLE TO SEE UNDERLYING DETAIL. PRELIMINARY REPORTS FROM USERS INDICATE THAT THE TRACES WILL NOT INTERFERE WITH INTERPRETATION MEASURE-

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MENTS. SINCE IT IS EXTREMELY IMPROBABLE THAT THE SAME TERRIAN
WOULD BE AFFECTED BY THE TRACES IN BOTH FRAMES OF A STEREO PAIR,
ANY IMAGE LOSS FROM THE TRACE IN A SINGLE FRAME WOULD BE MINI MIZED
BY STEREO VIEWING.

6. COMMENTS

A. THE PET INDEX CAMERA PHOTOGRAPHY ANALYSIS IS AS FOLLOWS:

1035-1 435 INDEX FRAMES

TERRAIN WITH LESS THAN 10 PERCENT CLOUDS: 196 OR 45 PERCENT

SNOW OR WATER WITH LESS THAN 50 PERCENT CLOUDS: 24 FRAMES

OR SIX PERCENT

TERRAIN WITH LESS THAN 50 PERCENT CLOUDS: 121 FRAMES OR

28 PERCENT

SNOW OR WATER WITH LESS THAN 50 PERCENT CLOUDS: 10 FRAMES

OR TWO PERCENT

COVERAGE WITH MORE THAN 50 PERCENT CLOUDS: 84 FRAMES OR

19 PERCENT

1035-2 465 INDEX FRAMES

TERRAIN WITH LESS THAN 10 PERCENT CLOUDS: 117 FRAMES OR

25 PERCENT

SNOW OR WATER WITH LESS THAN 10 PERCENT CLOUDS: 24 FRAMES

OR FIVE PERCENT

TERRAIN WITH LESS THAN 50 PERCENT CLOUDS: 130 FRAMES OR 27

PERCENT

SNOW OR WATER WITH LESS THAN 50 PERCENT CLOUDS: 20 FRAMES

OR FOUR PERCENT

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COVERAGE WITH MORE THAN 50 PERCENT CLOUDS: 184 FRAMES OR
39 PERCENT

B. ALL OF THE FILM FROM MISSION 1035-1 AND 1035-2 WAS
PROCESSED ON THE TRENTON EQUIPMENT.

T O P S E C R E T

--END OF MESSAGE--

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